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DIOPHANTINE ANALYSIS.

122. Proposed by L. E. DICKSON, Ph. D., The University of Chicago.

If p is a prime $(p^4 - 1)(p^2 - 1)$ has no factor of the form $1 + p^3x$, $x > 0$, if $p > 2$; $(p^6 - 1)(p^4 - 1)(p^2 - 1)$ has no factor of the form $1 + p^5x$, $x > 0$.

No satisfactory solution has been received.

MISCELLANEOUS.

145. Proposed by H. F. MacNEISH, Chicago, Ill.

Two complete 5-plane configurations in space having the same vertices are identical; in general two complete $(n+2)$ -faces in n -space having the same vertices are identical.

Solution by the PROPOSER.

We proceed at once to the general case.

Definition. An $(n+2)$ -face in n space is defined as the n -space configuration formed by $(n+2)$ $(n-1)$ -spaces and the intersections with the restriction that no $i+2$ $(i+j)$ -spaces have a common j -space.

Suppose one $(n+2)$ -face has the following notation: The $(n-1)$ -spaces are specified $A_{i_r}^{n-1}$ ($r=1 \dots n+2$), and any j -space has notation of the type $A_{i_1, \dots, i_{n-j}}^j$ and the incidence relations are fully specified by stating that $A_{i_1, \dots, i_{k-j}}^j$ lies in precisely every element of higher dimensions whose subscripts are all of the set i_1, \dots, i_{k-j} .

(I) Any three collinear points are of the type

$$A'_{i_1, i_2, \dots, i_{n-1}} = A^{0}_{i_1, i_2, \dots, i_n} A^{0}_{i_1, i_2, \dots, i_{n-1} \ i_{n+1}} A^{0}_{i_1, i_2, \dots, i_{n-1} \ i_{n+2}}.$$

We consider any two points with every possible third point and show that this type is the only possible type of three collinear points.

(a) $A^{0}_{i_1, i_2, \dots, i_n}$, $A^{0}_{i_1, i_2, \dots, i_{n-1} \ i_{n+1}}$ ($n-1$ subscripts common). With these two points $A^{0}_{i_1, i_2, \dots, i_{n-1} \ i_{n+2}}$ is collinear from the $(n+2)$ -face $A_{i_r}^{n-1}$; any other third point will be of the type $A^{0}_{i_2, \dots, i_{n+1}}$, which will then be on the line $A'_{i_1, i_2, \dots, i_{n-1}}$ (being collinear with $A^{0}_{i_1, i_2, \dots, i_n}$ and $A^{0}_{i_1, i_2, \dots, i_{n-1} \ i_{n+1}}$ in $(n+2)$ -face $A_{i_r}^{n-1}$) and then $n+1$ $(n-1)$ -space $A_{i_1}^{n-1}$, $A_{i_2}^{n-1}, \dots, A_{i_{n+1}}^{n-1}$ will pass through $A^{0}_{i_2, \dots, i_{n+2}}$ which contradicts the definition of an $(n+2)$ -face.

(b₁) $A^{0}_{i_1, i_2, \dots, i_n}$, $A^{0}_{i_3, i_4, \dots, i_{n+2}}$ ($n-2$ subscripts common) with $A^{0}_{i_1, i_2, \dots, i_{n-2} \ i_{n+1} \ i_{n+2}}$.

Now the line determined by $A^{0}_{i_1, i_2, \dots, i_n}$, $A^{0}_{i_3, i_4, \dots, i_{n+2}}$ lies in the plane $A^{0}_{i_3, \dots, i_n}$, and the line determined by $A^{0}_{i_1, i_2, \dots, i_n}$, $A^{0}_{i_1, i_2, \dots, i_{n-2} \ i_{n+1} \ i_{n+2}}$ lies in the